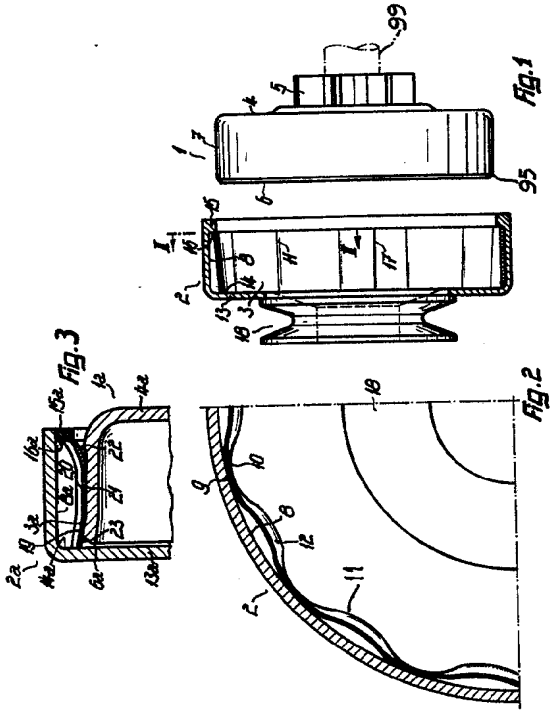
1376563 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1



1376563 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

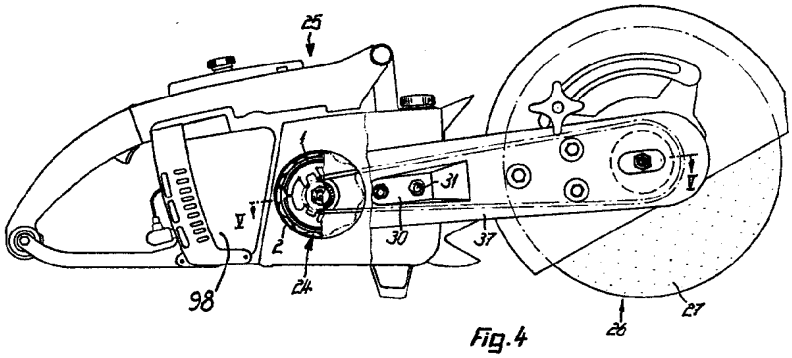


Fig.4

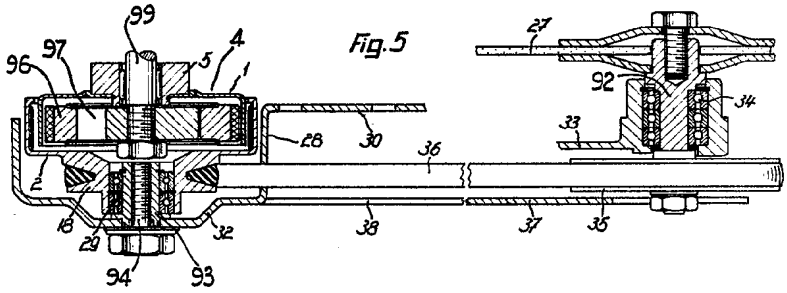


Fig.5

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(19)

(54) AN ATTACHMENT UNIT FOR THE ROTARY OUTPUT OF A POWER TOOL

(71) We, ANDREAS STIHL MASCHINENFABRIK, a German company, of 7051 Neustadt, Badstrasse 169, Germany,

do hereby declare the invention, which which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention relates to an attachment unit for attachment to the rotary output of a power tool. The invention has one application to the powering of an attachment tool, such as an abrasive disc, from the motor of a motor chain saw.

The attachment of a unit according to the present invention to a power tool can be made safely and easily as the careful close fitting of components is not involved in the attachment operation.

The attachment unit according to the present invention comprises an attachment unit body, a clutch member rotatable on said body and disposed for engagement with a complementary clutch member on the output of the power tool when said unit, is attached to the power tool, an attachment tool mounting on said body, drive means from the clutch member on the body to said attachment tool mounting, and resiliently flexible friction means engaged with said clutch member on the body and exposed for engagement with said clutch member.

The power tool may be a conventional motor chain saw with an output sprocket to which said complementary clutch member has been secured.

In one form of the invention the clutch member on said body is in the form of a drum and the friction means is in the form of a spring steel strip or ring located around the inner surface of the cylindrical wall of the drum. It is also envisaged that the friction means could be formed by segments. Adjacent segments may be spaced or abutting. The strip is preferably undulating along its length to have crests to contact the inner surface of the cylindrical wall of the drum and to have troughs to contact the outside of the wall of the complementary drum.

A complementary clutch member of drum form is generally produced as a deep drawn body and therefore lacks a precise cylindrical wall and has a characteristic flared shape of wall. In such arrangements the trough of an undulating friction strip is curved, transverse to the length of the strip, to complement said characteristic flared shape.

In order to be able to absorb great differences in tolerances on the dimensions of the clutch member, the elastic friction means should provide a relatively long spring stroke with a flat spring characteristic. Such a flat spring characteristic can be obtained, with an undulated spring strip, by a wide spacing of the undulations, thin strip, and by a small width of strip. It is particularly advantageous in this connection if the two tangents taken from the trough of an undulation in directions towards the adjacent crests of the undulations form between them an angle of about 140°.

The undulating spring strip may, in a simple manner, have its ends located directly adjacent to each other. However, it is also possible to form the undulated spring strip as an endless ring.

The undulating spring strip is preferably secured against axial movement such as by confining the strip between two annular shoulders. The shaping of the strip, in a direction transverse to the undulations is preferably such as to give close or line contact with the clutch members at the crests and troughs of the strip when those members first contact the strip.

The clutch part of a unit according to the invention may also provide for overload protection. The overload limit may be regulated such as by introducing an intermediate element in the friction means such as a steel band. Furthermore it is possible, as an intermediate element to use a lubricant such as grease.

The drive means of the unit may comprise, on the clutch member rotatable on said body, a pulley for a V-belt or a shaft coupling.

[Price 25p]

Thus, said clutch member may drive an attachment tool without a step-up or step-down transmission.

The invention will now be further described with reference to the accompanying drawings, in which:—

Fig. 1 illustrates the clutch members to operate a unit according to the invention, partly in plane side elevation and partly in sectional side elevation;

Fig. 2 represents a section taken along the line II—II of Fig. 1 but on a larger scale than the latter;

Fig. 3 is a sectional side elevation through a portion of a modification;

Fig. 4 illustrates an elevation of a motor chain saw having fitted thereto a unit according to the invention equipped with an abrasive attachment tool; and

Fig. 5 is a section taken along the V—V of Fig. 4 but on a larger scale than the latter.

Figs. 1 and 2 show a clutch member in the form of a drum 2 rotatable on a body or support 28 (Fig. 5) for engaging a complementary clutch member, in the form of a drum 1, on the output shaft 99 of a power tool 25 (Fig. 4). A resiliently flexible friction means in the form of an undulating spring steel strip 3 is shown engaged with the drum 2.

Clutch drum 1 is adapted in any convenient or standard manner to be connected to a power tool, for instance, a motor chain saw. As shown in Fig. 5 the clutch drum 1 is secured at end wall 4 to a sprocket 5 on tool 25 and the sprocket is journaled on the output shaft 99 of the internal combustion engine 98 associated with the tool 25. A rotor 97 located within the clutch drum 1 is connected to the shaft 99 and is provided for instance, with centrifugal fly elements 96 which are adapted at a certain speed to establish a driving connection between the rotor 97 and the clutch drum 1 so that the latter will rotate together with the crankshaft 99 and drives the sprocket 5. A saw chain normally passes over the sprocket wheel 5. The open end face 6 (Fig. 1) of the clutch drum 1 points away from the internal combustion engine of the tool 25. The outer wall surface 7 of the clutch drum 1 is substantially cylindrical although it will have a characteristic flared shape if deep drawn and is provided with a chamfer 95 at the open end face 6.

The drum 2, which may also be a deep drawn element, has a substantially cylindrical inner wall surface 8, the diameter of which is greater than the diameter of the outer surface 7 of drum 1. This surface 8 is engaged by an undulated spring steel strip or ring 3 along contacting surfaces 9 at the uncurved crests 10 of the undulations. The troughs 12 of the undulated spring 3 are curved in section transverse to the length of the strip or ring to form contacting fricion surfaces 11 which are associated with the outer surface 7 of drum 1 and in engaged position engage said drum 1. The undulated spring 3 is secured in the axial direction, relative to the drum 2 by engaging two annular shoulders 14, 16. One annular shoulder 14 is formed by the inner surface of the end face wall 13 of the drum 2, and the other annular shoulder 16 is formed by the inner surface of a radially protruding marginal area 15 at the open side of the drum 2. The inner diameter of the annular marginal area 14 is greater than the diameter of the outer surface 7 of clutch drum 1 and is furthermore greater than the maximum diameter on which are located the friction surfaces 11 of spring 3.

The undulated spring 3 is slightly conically widened in the direction toward the open side of the drum 2, that is the spring 3 is flared to permit ready entry of drum 1 into it.

The undulated spring 3 is, in confirmity with embodiment illustrated by way of example in the drawings, formed by a bent undulated spring band, the ends of which are located directly adjacent to each other at 17, these ends engaging the inner surface 8 of the drum 2.

A V-belt pulley 18 is connected to the outside of the end wall face 13 of the drum 2. A V-belt may be placed upon said pulley 18 for driving an attachment tool such as an abrasive cutting-off disc 27 (Fig. 4). In the pulley 18 there is shown a journaled draw-off spindle 94 which is accessible from the outer end face side of pulley 18 and which, with the drum 2 clutched to the drum 1, may be loaded against the end face of the crankshaft so that the drum 2 can be pulled away from the clutch drum 1. The spindle 94 (not illustrated in detail) is shown in a threaded sleeve 93 which carries bearings 29 for pulley 18.

In Fig. 3 parts corresponding to those described in connection with Figs. 1 and 2 are designated with the same reference numerals as in Figs. 1 and 2 but with the additional letter "a". When the drum 1a is produced as a deep drawn element, for ease of manufacture, the flared characteristic shape illustrated in Fig. 3 is obtained according to which the outer wall surface of the drum is, within the region 19 of the open marginal area 6a bent outwardly, whereas in the intermediate region 20 it is conically widened toward the open side 6a at a smaller angle than within the marginal region 19. The cross section of the troughs of spring 3a are arranged to conform with the flared shape of the wall of drum 1a. Thus, the friction surfaces of the spring 3a which engage the drum 1a comprise a central section 21 which engages the region 20 of the outer surface of drum 1a and has the same flare as the region 20. This central section 21 is followed by sections 22, 23 which respectively extend

toward the pertaining end of the spring 3a away from the axis of the output drum 2a. In this way, within the region of the open side of the output drum 2a, there is formed a funnel-shaped widening or flared opening of the ring 3a so that the clutch drum 1a can easily be inserted thereinto. The cross-sectional end region 23 in the vicinity of the end face wall 13a of the drum 2a serves for engagement with the upwardly bent marginal region 19 of the outer surface of drum 1a. When drum 2a is placed upon the drum 1a, the intermediate sections 21 of the spring ring 3a spring behind the outwardly bent marginal region 19 of the outer surface of clutch drum 1a so that an axially directed force component acts upon the drum 2a which force component pulls the drum 2a upon the drum 1a. One annular shoulder 16a which serves for supporting the undulated spring 3a is with the embodiment illustrated in Fig. 3 formed by a ring 15a which is inserted into the output drum 2a and is then joined thereto.

As will be seen from Figs. 4 and 5, it is possible by means of the clutch device 24 comprising drum 1 and 2 and spring ring 3 to arrange for an attachment tool 26 to be driven by the motor of chain saw 25. To fit the attachment unit and tool 26, the customary guiding rail for the saw chain is removed and the drum 2 is placed upon the exposed clutch drum 1. The drum 2 is, by means of the bearing 29, rotatably journaled on an attachment unit body or support 28 which, adjacent to the drum 2, comprises a connecting flange 30 for connecting the unit to the side of the housing of the motor chain saw 25 by means of bolts 31. The support 28 forms a protective cap 32 which extends around the drum 2. The drum 2 and pulley 18 are located in the cap 32.

As an extension of flange 30, the support 28 has an attachment tool mounting in the form of a supporting arm 33 which, in its end, is provided with bearings 34 for the spindle 92 of an abrasive disc 27. Arranged on the spindle is a V-belt pulley 35 which is driven by the pulley 18 of drum 2 through a V-belt 36. At those sides of the belt pulleys which face away from the motor chain saw 25 and from the disc 27, the support 28 carries a protective plate 37 which covers the V-belt 36 and pulley 35 from the outside and is provided with an opening 38 through which the bolts 31 and the connecting flange 30 are accessible.

WHAT WE CLAIM IS:—

1. An attachment unit for attachment to the rotary output of a power tool comprising, an attachment unit body, a clutch member rotatable on said body and disposed for engagement with a complementary clutch member on the output of the power tool when said unit as attached to the power tool, an attachment tool mounting on said body, drive means from the clutch member on the body to said attachment tool mounting, and resiliently flexible friction means engaged with said clutch member on the body and exposed for engagement with said complementary clutch member.

2. A unit according to claim 1, in which the clutch member on the body is of drum form and the friction means is in the form of a spring strip or ring located around the inner surface of the cylindrical wall of the drum.

3. A unit according to claim 1 in which the clutch member on the body is of drum form and the friction means is formed by segments arranged around the inner surface of the cylindrical wall of the drum.

4. A unit according to claim 2 in which the spring strip or ring is undulating in the direction along its length.

5. A unit according to claim 4 in which the crests of the undulations, that is the parts which contact the inner surface of the cylindrical wall of the drum, are uncurved and the troughs are curved in section transverse to the length of the strip or ring.

6. A unit according to any one of claims 2, 4 or 5, in which the width of the strip or ring is approximately equal to the axial length of the cylindrical wall of the drum.

7. A unit according to claim 5 in which the curvature of the troughs is such as to complement the flared shape characteristic of the walls of a deep drawn drum to make contact with such walls.

8. A unit according to claim 2 in which the strip or ring is flared to permit ready entry of a drum form complementary clutch member into it.

9. A unit according to claim 4 in which the undulated spring strip or ring is arranged to remain undulated when engaged by said complementary clutch member.

10. A unit according to claim 4 in which the undulations are formed so that the two tangents taken from the trough of an undulation in directions towards adjacent crests of the undulations form between them an angle of about 140°.

11. A unit according to claim 4 in which the ends of the strip are located adjacent to each other.

12. A unit according to claim 6, in which the strip or ring is axially secured between two annular shoulders.

13. A unit according to any one of the preceding claims, in which an intermediate member is provided to lie between at least one friction surface of the friction means and the pertaining counter friction surface.

14. A unit according to any one of the preceding claims, in which the drive means

comprises a V-belt pulley connected to the clutch member rotatable on said body.

15. A unit according to any one of the preceding claims, in which there is provided a draw-off spindle to draw off the clutch member rotatable on said body from said complementary clutch member.

16. An attachment unit for the rotary output of a power tool substantially as hereinbefore described with reference to Fig. 1, 2, 4 and 5 of the accompanying drawings or as modified by Fig. 3 of those drawings.

17. The combination of a power tool including said complementary clutch member with an attachment device according to any preceding claim and with an attachment tool on said mounting.

18. The combination of claim 17 in which said power tool is a chain saw.

19. The combination of claim 17 in which said attachment tool is an abrasive wheel.

20. The combination substantially as hereinbefore described with reference to Figs. 4 and 5 of the accompanying drawings.

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